We claim:

1. A re-recordable data storage medium comprising:

a phase-changeable layer having a plurality of phases, each phase corresponding to a different storable logical value; and,

an intermediate layer, a junction between the intermediate layer and another layer of the medium providing a conduction barrier under no illumination that is substantially diminished under illumination of the regions of the phase-changeable layer that are in the appropriate phase.

2. The medium of claim 1, wherein the junction is between the intermediate layer and the phase-changeable layer.

3. The medium of claim 1, further comprising a substrate, and the junction is between the intermediate layer and the substrate.

4. The medium of claim 1, further comprising a top contact to the phase-changeable layer and a bottom contact.

5. The medium of claim 4, wherein the top contact is biased relative to the bottom contact.

6. The medium of claim 1, wherein the junction between the intermediate layer and the other layer provides a first resistance between the top and bottom layers under no illumination and a second resistance under illumination of the regions of the phase-changeable layer that are in the appropriate phase less than the first resistance.

7. The medium of claim 1, wherein the phase-changeable layer comprises a plurality of phase-changeable sub-portions, each sub-portion having a plurality

of phases, each phase corresponding to a different storable logical value independent of other of the plurality of sub-portions.

8. The medium of claim 1, wherein a first phase of the plurality of phases corresponds to the phase-changeable layer being crystalline, and a second phase of the plurality of phases corresponds to the phase-changeable layer being amorphous.

9. The medium of claim 1, wherein the medium is at least one of an electronic device and an integrated circuit (IC).

10. A re-recordable data storage medium comprising:

a phase-changeable layer having a first phase corresponding to a first storable logical value and a second phase corresponding to a second storable logical value; and,

a plurality of layers including the phase-changeable layer and acting as a illumination-sensitive transistor having a first resistance under no illumination and a second resistance under illumination of the regions of the phase-changeable layer that are in the appropriate phase that is substantially less than the first resistance.

11. The medium of claim 10, where the plurality of layers comprises, in addition to the phase-changeable layer, an intermediate layer, and a bottom one or more layers.

12. The medium of claim 11, wherein the intermediate layer and the phase-changeable layer define a junction acting as a conduction barrier under no illumination that is substantially diminished under illumination of the regions of the phase-changeable layer that are in the appropriate phase.

13. The medium of claim 11, wherein the intermediate layer and one of the bottom one or more layers define a junction acting as a conduction barrier under no illumination that is substantially diminished under illumination of the regions of the phase-changeable layer that are in the appropriate phase.

14. The medium of claim 10, wherein the phase-changeable layer comprises a plurality of phase-changeable sub-portions, each sub-portion having a changeable phase as one of the first phase and the second phase independent of other of the plurality of sub-portions.

15. A re-recordable data storage medium comprising:

first means for repeatedly storing a data value selected from a first logical value and a second logical value; and,

second means for providing a conduction barrier under no illumination that is substantially diminished under illumination of the regions of the first means.

16. A method comprising:

providing a first layer of a re-recordable data storage medium;

providing a second layer over the first layer; and,

providing a phase-changeable layer over the second layer having a crystalline phase corresponding to a first storable logical value and an amorphous phase corresponding to a second storable logical value,

wherein the second layer and one of the first layer and the phase-changeable layer defining a junction that acts as a conduction barrier under no medium illumination that is substantially diminished under medium illumination.

17. The method of claim 16, further initially comprising providing a bottom contact on which the first layer is provided and connectable to an appropriate bias.

18. The method of claim 16, further comprising providing a contact to the phase-changeable layer and connectable to a current sensing circuit that provides an appropriate bias relative to the contact to the first layer.

19. A re-recordable data storage medium constructed by performing a method comprising:

providing a first layer of a re-recordable data storage medium;

providing a second layer over the first layer; and,

providing a phase-changeable layer over the second layer having a crystalline phase corresponding to a first storable logical value and an amorphous phase corresponding to a second storable logical value,

such that the second layer and one of the first layer and the phase-changeable layer define a junction acting as a conduction barrier under no medium illumination that is substantially diminished under medium illumination.

20. The medium of claim 19, further initially comprising providing a contact on which the first layer is provided and connectable to an appropriate bias, and further comprising providing a contact to the phase-changeable layer and connectable to a current sensing circuit that provides an appropriate bias relative to the first layer.

21. A method comprising:

illuminating a beam on a re-recordable data storage medium having a phase-changeable layer having a phase indicative of a stored logical value and a first layer and a second layer defining a junction with the phase-changeable layer that has a lowered conduction barrier resulting from illumination of the beam onto regions of the phase-changeable layer that are in an appropriate phase;

detecting current flowing through the re-recordable data storage medium; and,

determining the stored logical value based on the current flowing through the re-recordable data storage medium as detected.

22. The method of claim 21, wherein the beam illuminating the storage medium comprises one of an electron beam and a laser beam.

23. The method of claim 21, wherein detecting the current flowing through the re-recordable data storage medium comprises detecting the current as one of substantially a first current corresponding to a first phase of the phase-changeable layer indicating a first stored logical value, and a second current corresponding to a second phase of the phase-changeable layer indicating a second stored logical value.

24. The method of claim 23, wherein determining the stored logical value comprises one of determining the stored logical value as the first stored logical value based on detecting the first current, and as the second stored logical value based on detecting the second current.

25. A mass-storage device comprising:

a first mechanism receptive to a re-recordable data storage medium having a conduction barrier having a resistance that is substantially decreasable upon illumination and a phase-changeable layer having a plurality of sub-portions, each sub-portion having a phase indicative of a stored logical value;

an array of beam generators, each corresponding to at least one of the plurality of sub-portions of the medium, each beam generator capable of generating an illuminating beam at a first level to reduce the resistance of the conduction barrier layer to induce current flow through the corresponding sub-portion of the medium; and,

a second mechanism to detect the current flow induced through a currently illuminated sub-portion of the medium and to correlate the current flow detected with the stored logical value of the currently illuminated sub-portion.

26. The device of claim 25, further comprising a voltage source to bias the medium.

27. The device of claim 25, wherein the second mechanism comprises a detector to detect the current flow induced through the currently illuminated sub-portion of the medium and an evaluator to correlate the current flow detected with the stored logical value of the currently illuminated sub-portion.